Secretary General's Column

Being safe and productive in this modern world

by *Richard Hartshorn*

I think it is fair to say that 2020 is a year when personal safety is something of a preoccupation. The Covid-19 pandemic is currently ravaging the world, and it seems inescapable that by the time this article goes to press there will be many thousands more deaths, and countless more infected and sick. As individuals, communities, and countries, we will rightly be focused on staying safe and reducing the chances of exposure and infection.

Staying safe, however, is something that we, as chemists, regularly think about even in more normal times, particularly in the context of chemical hazards. Our experiments and processes often involve the use of toxic or dangerous compounds, and carry the inherent risk that the reactions we are performing may produce new ones with unknown and perhaps dangerous properties. This is even before we consider the possibilities of unanticipated reactions and perhaps even some that run out of control, or occur violently, perhaps explosively.

It is standard practice for researchers to conduct risk assessments before they attempt reactions, and one element of this will typically involve examining the toxicities of the reagents, often by consulting Safety Data Sheets (SDSs), which have normally been produced according to the United Nations Globally Harmonised System of Classification and Labelling of Chemicals (GHS, http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html). Many countries have regulations and standards that require and use such approaches, and the harmonisation of the GHS is a vital part of making it easier for users to find and employ the information that they need. Reaction scales and conditions (e.g. temperatures and pressures) are also vital considerations during these risk assessments.

Typically there will be some kind of sign-off process for a risk assessment that a researcher has prepared. This will hopefully decrease the chances that something important to the assessment has been missed, and it provides an opportunity to discuss the degree to which the hazards that have been identified can be mitigated or, better yet, removed entirely. The

key problem with this approach is that it is reliant on the collective experience of the assessor and reviewer. They need to be able to recognise situations that may be problematic and to be able to offer suggestions about how to deal with them. This is one of the reasons why chemists often share lab-nerd anecdotes that tell of bad experiences and near-misses, and serve as a form of early warning system. Unfortunately, sometimes even relatively innocuous reagents can combine to produce unexpectedly dangerous situations.

Wouldn't it be better to have a way to share such experiences more formally and to provide a resource that can be consulted and searched as part of planning reactions and processes?

The Pistoia Alliance (<https://www.pistoiaalliance.org/>) has developed the Chemical Safety Library project (<https://www.pistoiaalliance.org/projects/current-projects/chemical-safety-library/>) to address this very issue. Anyone can contribute detail on a reaction incident or hazard to the database, which is curated by an advisory panel, and then made available to the public. Openly sharing data of this kind can only make the chemical community safer, and I encourage you and your organisations to contribute to and use this new resource.

IUPAC also undertakes projects in the area of safety, and among these, perhaps the highest profile belongs to the Safety Training Program (STP) that is run by the Committee on Chemistry and Industry (<https://iupac.org/body/022-1>). In these projects, STP fellowship candidates from developing countries are trained to deliver environmental, health, and safety programs to their institutions and home countries.

In the meantime, in many places around the world, the day to day safety challenges revolve around regular handwashing, physical distancing, and appropriate personal protective equipment (PPE). We have also been learning a great deal about the strengths and weaknesses of teleconferences and the challenges of rapid conversion of courses to on-line teaching modes. Much of our chemistry, be it in research labs, lab courses, or company facilities, is heavily dependent on actually being there together, so lock-downs may have been hard and possibly very unproductive for you. If that is you, you have my sympathy, and I wish you all the very best for a rapid but safe return to productivity. 🇬🇧

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